

NON-PUBLIC?: N
ACCESSION #: 9303090320
LICENSEE EVENT REPORT (LER)

FACILITY NAME: South Texas, Unit 2 PAGE: 1 OF 5

DOCKET NUMBER: 05000499

TITLE: Reactor Trip Due to Low Steam Generator Water Level
EVENT DATE: 02/03/93 LER #: 93-004-00 REPORT DATE: 03/05/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
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COMPONENT FAILURE DESCRIPTION:
CAUSE: A SYSTEM: BA COMPONENT: TUR MANUFACTURER: T147
REPORTABLE NPRDS: Yes

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On February 3, 1993, Unit 2 was in Mode 1 at 100% power. At 1448 hours, Unit 2 experienced an automatic reactor trip due to low Steam Generator water level. The low Steam Generator water level was caused by a loss of Steam-driven Feedwater pump #21 in conjunction with a failure of the Startup Feedwater Pump due to low oil pressure. The cause of this event was ineffective action to correct previous failures of the Startup Feedwater pumps and Steam Driven Feedwater pumps. Corrective actions include troubleshooting and repairing the Startup Feedwater pump and Steam Driven Feedwater pump. A walkdown of both units' Feedwater Isolation Bypass Valves was conducted to identify similar problems with valve positioners. Modifications to improve the reliability of the Steam Driven Feedwater pumps and Startup Feedwater pumps will be implemented.

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END OF ABSTRACT

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DESCRIPTION OF EVENT:

On February 3, 1993, Unit 2 was in Mode 1 at 100% power. At 1448 hours, Control Room operators received a high bearing temperature alarm on Steam Driven Feedwater pump #21. At 1452 hours, Feedwater Booster pump #23 and the Unit 2 Startup Feedwater pump were started and placed into service. Steam Driven Feedwater pump #21 was then tripped. At 1523 hours, the Startup Feedwater pump tripped on low oil pressure caused by clogged coalescing filters. Reactor power reduction was commenced immediately in an attempt to reduce steam demand below feedwater system makeup capability. During the power reduction, control rods were placed in automatic and the Main Turbine control system was operated utilizing the governor valve limiter for turbine load reduction. The secondary steam load was reduced beyond that of reactor power resulting in the actuation of the Main Condenser steam dumps.

Shortly thereafter the turbine load was further reduced in conjunction with closure of the steam dumps in an attempt to reduce steam flow below feedwater flow. The reduction in steam demand resulted in a rapid increase in Steam Generator pressure. The rapid pressure increase resulted in a shrink in water level in all the Steam Generators and an automatic reactor trip on Low-Low Steam Generator narrow range level.

Following the reactor trip, the Auxiliary Feedwater (AFW) system actuated as expected. The "D" train Turbine Driven AFW pump tripped on overspeed on accuation. In conjunction with the "D" train AFW pump trip the "A" train Feedwater Isolation Bypass Valve was noted to be open during the performance of the Reactor Trip Response Emergency Operating Procedure. Operators were dispatched to the valve and closure was obtained when instrument air was removed.

At 1535 hours, boration of the Reactor Coolant System was initiated via the Emergency Boration Flowpath. The plant was stabilized in Mode 3. The NRC was notified on February 3, 1993, at 1654 hours.

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CAUSE OF EVENT:

The cause of this event was ineffective action to correct failures of the Startup Steam Generator Feedwater pumps, Steam Driven Feedwater pumps and

Feedwater Isolation Bypass Valves. The failure to effectively correct the root cause of these problems has resulted in unnecessary loss of availability and reduced unit reliability.

The cause of the Steam Driven Feedwater pump bearing damage was intrusion of hard particles resulting in abrasive destruction of the babbitt bearing surface and shaft scoring.

The trip of the Startup Feedwater pump was due to water content in the oil reservoir which was caused by mechanical seal leakage. The seal leakage is apparently due to vibration induced wear.

The AFW pump #24 overspeed was due to the presence of water in the piping upstream of the steam inlet isolation valve (MS-0514). (Corrective actions are addressed in Unit 1 LER 93-007.)

The "A" train Feedwater Isolation Bypass Valve failure was caused by the disengagement of the locking nut on the positioner feedback mechanism. The disengagement of the locking nut was due to less than adequate maintenance practices.

ANALYSIS OF EVENT:

This event is reportable pursuant to 10CFR50.73(a)(2)(iv). There were no adverse radiological or safety consequences as a result of this event. All Engineered Safety Systems functioned as designed, with the exception of the problems with the overspeed of AFW pump #24 and the failure of the "A" train Feedwater Isolation Valve Bypass.

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CORRECTIVE ACTIONS:

1. Extensive troubleshooting and root cause analysis was performed on AFW pump #24 (Corrective actions are addressed in Unit 1 LER 93-007.)
2. The Unit 2 Startup Feedwater pump mechanical seal has been sent to the vendor for failure analysis.
3. The Unit 2 Startup Feedwater pump, Steam Driven Feedwater pump #21 and the "A" train Feedwater Isolation Bypass Valve will be repaired in the upcoming Unit 2 refueling outage.
4. A walkdown of both units Feedwater Isolation By

ass Valves was conducted. one valve was found to have a similar problem with the valve positioners becoming loose and has been repaired.

5. The Steam Driven Feedwater pump shafts will be modified by the use of chrome plating. This change minimizes damage due to hard particle intrusion. This action will be completed in Unit 1 by the end of the fifth refueling outage and in Unit 2 by the end of the third refueling outage.

6. The Startup Feedwater pump seals will be modified to install a design that precludes water intrusion. Additionally, the coalescing filter design will be changed to place a bypass flow path around the filter such that clogged filters will not cause a pump trip. These modifications will be completed in Unit 1 by the end of the fifth refueling outage and in Unit 2 by the end of the third refueling outage.

7. The maintenance procedure governing work on valve positioners will be revised to ensure tightening of lock nuts and verifying that the follower arms are properly installed. This will be completed by June 4, 1993.

8. Maintenance I&C technician training will be reviewed to ensure that I&C technicians are receiving the appropriate skills training to implement work properly. Training will be revised as necessary. This review will be completed by July 1, 1993.

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CORRECTIVE ACTIONS: (Con't)

9. An evaluation is being performed to identify if there are other valves with a similar configuration which are susceptible to problems with the valve positioner. This evaluation will be completed by March 30, 1993. Additional corrective actions will be developed as necessary.

10. Licensed operator simulator training will be reviewed for the inclusion of large secondary system transients. This review will be completed by April 30, 1993.

ADDITIONAL INFORMATION:

Previous events that have been reported to the NRC within the last three

years regarding a reactor trip as a result of low Steam Generator level were:

- o Unit 2 LER 92-003 regarding a reactor trip on February 24, 1992. The cause of this event was attributed to rain water intrusion through the expansion joints in the Turbine Generator Building roof and into the Electro-hydraulic Control cabinet.

- o Unit 1 LER 90-005 regarding a reactor trip on low Steam Generator level due to a Feedwater Booster pump trip. The cause of this event was the tripping of Feedwater Booster pump 11 and failure of the backup Feedwater Booster pump 13 to provide sufficient feedwater flow to the main Steam Driven Feedwater pumps. The Feedwater Booster pump 11 trip was due to a defect or weakness in the pump motor windings or feeder cable insulation.

- o Unit 1 LER 90-006 regarding a manual trip due to full closure of a Feedwater Isolation valve during a partial stroke test. The cause of this event was personnel error.

- o Unit 1 LER 90-023 regarding a manual trip due to full closure of a Feedwater Isolation valve during a partial stroke test. The cause of this event was also due to personnel error.

- o Unit 2 LER 90-004 regarding a reactor trip on low Steam Generator level due to a Feedwater Regulating valve. The cause of this event was a mechanical failure of the Steam Generator 2C Main Feedwater Regulating Valve due to loosening and subsequent separation of the valve stem to plug connection.

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